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Circulatory Responses to Smoking in Healthy Young Men

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The circulatory response to cigarette smoking has been studied in healthy medical students by means of the ballistocardiographic smoking test. Control blood pressure, heart rate, and ballistocardiogram are obtained with the subject at rest on a Starr-type ballistocardiographic bed, after which the subject smokes two standard cigarettes in succession; measurements are repeated after each cigarette. Stroke volume, cardiac output and cardiac index are calculated from the ballistocardiogram.

Statistically significant mean changes in all measurements were found following one cigarette. The direction and degree of change after smoking varied grea ly from subject to subject, resulting in strikingly different individual patterns. When subjects were grouped according to the presence or absence of parental hypertensi or coronary disease, different patterns of response for the various groups were noted.

In reproducibility studies consisting of eight tests on each of six subjects the first test appeared to be an unbiased estimate of the mean. Tests performed with the subject in a fasting state resulted in lower control readings than those at other times of day, with a complementary increase in the response to smoking, so that the final figures after smoking were remarkably constant.

The response to the smoking test was compared with the response to the cold pressor test in 386 young men. In both tests, age and smoking habits affected the magnitude of the responses very little. Also, systolic pressure, diastolic pressure and heart rate showed approximately normal distribution so that they all appeared to be continuous variables; any dividing line to distinguish "hyperreactors" in either test seems purely arbitrary. Correlations between circulatory responses to the two tests were relatively low. Independent information is gained from the smoking test and from the cold pressor test. Accordingly, both tests contribute to the appraisal of individual circulatory reactivity.

A review of the records of 245 subjects as to ballistocardiographic form revealed that 7.4 per cent showed borderline or early abnormal changes after smoking. Less than 2.0 per cent showed deviations from normal form before smoking. A significantly greater proportion of subjects with form changes were overweight and had high cholesterol levels compared with subjects with normal ballistic form.

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